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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/038,084

01/03/2002

Robert J. Falster

MEMC 98-3052 (2512.2)

7363

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7590

05/07/2003

SENNIGER POWERS LEAVITT AND ROEDEL
ONE METROPOLITAN SQUARE
16TH FLOOR
ST LOUIS, MO 63102

EXAMINER

MAI, ANH D

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/038,084

Applicant(s)

FALSTER, ROBERT J.

Examiner

Anh D. Mai

Art Unit

2814

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4-51 is/are pending in the application.
- 4a) Of the above claim(s) 4-46 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 47-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 January 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3 6) ☐ Other:

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Group II, claims 47-51 in Paper No. 5 is acknowledged.

Specification

2. The lengthy specification *has not been checked* to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Objections

3. Claim 51 is objected to because of the following informalities:

The claimed temperature "8000C and 10000C" appear to be a typo, the correct temperature are "800 °C and 1000 °C".

Appropriate correction is required.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 47-51 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 9, 17-20, 27, 30 and 38 of U.S. Patent No. 6,236,104 and claims 1, 7 and 40-42 of U.S. Patent No. 6,342,725. Although the conflicting claims are not identical, they are not patentably distinct from each other because all limitations of the present claims have been recited by the patents including:

a single crystal silicon device layer in which there is a predominant intrinsic point defect which is substantially free of agglomerated vacancy-type defects;

a single crystal silicon handle wafer; and,

an insulating layer between the device layer and the handle wafer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 47-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakato et al. (U.S. Patent No. 5,436,175) in view of Horai et al. (JP. Patent No. 08-330316) all of record.

Nakato teaches a silicon on insulator structure substantially similar as claimed including:

a single crystal silicon device layer (12);

a single crystal silicon handle wafer (14); and,

an insulating layer (26) between the device layer and the handle wafer.

Thus Nakato is shown to teach all the features of the claim with the exception of explicitly disclosing the characteristics of the single crystal silicon device layer (12).

However, Horai teaches forming highly integrated semiconductor element using the defects free semiconductor substrate. (See Abstract).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the SOI structure of Nakato using substantially defects free semiconductor substrate as taught by Horai to avoid junction leakage characteristics caused by well known dislocation clusters (agglomerated vacancy-type defects).

With respect to claim 48, the wafer grown by CZ of Horai has an oxygen content less than about 13 PPMA are well known in the art.

With respect to claim 49, the handle wafer (14) of Nakato, in view of Horai, further comprises two major, generally parallel surfaces, one of which is the front surface and the other of which is the back surface of the silicon wafer (14), a central plane between the front and back surfaces, the circumferential edge joining the front and back surfaces, a surface layer which comprises a first region of the silicon wafer between the front surface and a distance, D1, of at least about 10 micrometers, as measured from the front and a bulk layer which surface and toward the central plane, comprises a second region of the silicon wafer between the central plane and the first region, the silicon wafer having a non-uniform concentration of vacancies with the concentration of vacancies in the bulk layer being greater than the concentration of

Art Unit: 2814

vacancies in the surface layer such that, upon subjecting the wafer to an oxygen precipitation heat treatment, a denuded zone is formed in the surface layer and oxygen clusters or precipitates are formed in the bulk layer with the concentration of the oxygen clusters or precipitates in the bulk layer being primarily dependant upon the concentration of vacancies.

These are the inherent characteristics of the SOI substrate under thermal anneal following the implantation.

With respect to claim 50, the handle wafer (14) of Nakato, in view of Horai, further comprises two major, generally parallel surfaces, one of which is the front surface and the other of which is the back surface of the silicon wafer (14), a central plane between the front and back surfaces, the circumferential edge joining the front and back surfaces, and a denuded zone which comprises the region of the silicon wafer from the front surface to a distance, D_1 , of at least about 10 micrometers, as measured in the direction of the central plane, and which contains interstitial oxygen, the silicon wafer having a concentration of interstitial oxygen in the denuded zone at a distance equal to about one-half of D , is at least about 75% of the maximum concentration of interstitial oxygen in the denuded zone.

These are the inherent characteristics of the SOI substrate under thermal anneal following the implantation.

With respect to claim 51, the handle wafer (14) of Nakato, in view of Horai, further comprises two major, generally parallel surfaces, one of which is the front surface and the other of which is the back surface of the silicon wafer (14), a central plane between the front and back

Art Unit: 2814

surfaces, the circumferential edge joining the front and back surfaces, a front surface layer consisting of a first region of the silicon wafer within a distance, D , of no more than about 15 micrometers from the front surface and a bulk layer comprising a second region of the silicon wafer between the central plane and the front surface layer, the bulk layer having a substantially uniform oxygen concentration and a concentration of crystal lattice vacancies.

These are the inherent characteristics of the SOI substrate under thermal anneal following the implantation.

Product by process limitation:

The expression “*such that upon subjecting the silicon wafer to an oxygen precipitation heat treatment consisting essentially of annealing the silicon wafer at 800 °C for four hours and then at 1000 °C for sixteen hours, the silicon wafer will contain oxygen precipitates having a concentration profile in which the peak density of the precipitates in the bulk layer is at or near the central plane with the concentration of the precipitates in the bulk layer generally decreasing in the direction of the front surface layer*” is taken to be a product by process limitation and is given no patentable weight. A product by process claim directed to the product per se, no matter how actually made, *In re Hirao*, 190 USPQ 15 at 17 (footnote 3). See *In re Fessman*, 180 USPQ 324, 326 (CCPA 1974); *In re Marosi et al.*, 218 USPQ 289, 292 (Fed. Cir. 1983); and particularly *In re Thorpe*, 227 USPQ 964, 966 (Fed. Cir. 1985), all of which make it clear that it is the patentability of the final structure of the product “gleaned” from the process steps, which must be determined in a “product by process” claim, and not the patentability of the process. See

Art Unit: 2814

also MPEP 2113. Moreover, an old and obvious product produced by a new method is not a patentable product, whether claimed in "product by process" claims or not.

With respect to the dimension of 10 and 15 micrometers of claims 49-51, note that the specification contains no disclosure of either the *critical nature of the claimed dimension of any unexpected results arising therefrom*. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

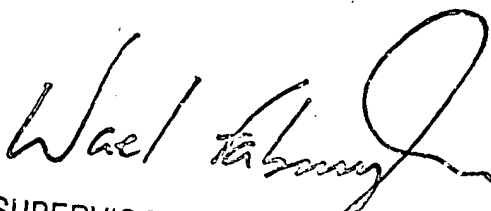
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (703) 308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
May 2, 2003


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800